



*Thursday PM*

*AP*

*Session 54*

*Salon 3*



## **Wireless Communications Technology**

*J. E. Richie and R. B. Waterhouse*

- 1:20 Up-Link Polarization Diversity and Antenna Gain Measurement of Hand-Held Terminal  
*Masayuki Nakano, Toshio Satoh, Nippon Idou Tsushin Corporation, Hiroyuki Arai, Yokohama National University*
- 1:40 Two Methods for Estimating the Diversity Characteristics of Built-in Antennas for Mobile Communication Equipment  
*Tadahiko Maeda\*, Syuichi Sekine, Shuichi Obayashi, Tasuku Morooka, Toshiba Research and Development Center*
- 2:00 A 2-D Ray Tracing Model for the Characterization of Spatial and Time-Domain Properties of the Indoor Propagation Channel  
*Michael L. Tobin, James E. Richie\*, Marquette University*
- 2:20 An SBR/Image Approach to Indoor Radio Propagation Modeling  
*S-H. Chen, S-K. Jeng\*, National Taiwan University*
- 2:40 The Effects of Reinforced Concrete Walls/Floors on Wireless personal communications Systems (PCS)  
*Michael Yan Wah, Chia, National University of Singapore*



3:00 BREAK

- 3:20 Characterization of Indoor Radio Propagation Environments by Cluster Analysis as Preprocessing for Neural Network Model  
*Qin Zhou\*, A. K. Y. Lai, Chinese University of Hong Kong*
- 3:40 Genetic Algorithm Optimization of Wireless Communication Networks  
*J.M. Johnson\*, Y. Rahmat-Samii, UCLA*
- 4:00 A Method of Evaluating Spectrum Utilization in the VHF and UHF Bands  
*V.S. A Adeloye, Brunel University*
- 4:20 Demonstration of a Millimeter-Wave Wireless Link Incorporating Microstrip Patches and a Novel Optical Feeding Technique  
*D. Novak, Z. Ahmed, University of Melbourne, R. B. Waterhouse, Royal Melbourne Institute of Technology*

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**Thursday PM      AP      Session 55      Salon 4**

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**Antenna Arrays IV**

*J. Piotr Starski and R. L. Eisenhart*



- 1:20 Calibration Block for Digital Beam Forming Antenna  
*J. Piotr Starski, Chalmers University of Technology*
- 1:40 Investigation of Various Feed Structures for Linear Arrays of Dielectric Resonator Antennas  
*A. Petosa\*, J.S. Wight, Carleton University, R.K. Mongia, A. Ittipiboon, Carleton University*
- 2:00 A Generalised Projection Technique for the Synthesis of Conformal Arrays  
*O. M. Bucci\*, G. D'Elia, G. Romito, Universita di Napoli*
- 2:20 A Concentric Array Wide-Band Radial Line Slot Antenna with Matching Terminating Slots  
*T. Yamamoto\*, M. Ando, N. Goto, Tokyo Institute of Technology*
- 2:40 A Very Small Aperture Concentric Array Radial Line Slot Antenna  
*M. Ando\*, M. Ueno, N. Goto, Tokyo Institute of Technology, Y. Yoshida, T. Yoshimoto, M. Suzuki, Toppan Printing Co., Ltd.*
- 3:00 BREAK
- 3:20 Mutual Coupling Effects and Radiation Characteristics of a Linear Array of Dielectric Resonator Elements Fed by Coaxial Probes  
*G. P. Junker, A. W. Glisson\*, A. A. Kishk, University of Mississippi*
- 3:40 Phased Array Scanning Performance Simulation  
*R.L. Eisenhart\*, Eisenhart & Associates, P.K. Park, Hughes Missle Systems*





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- 4:00 Linear Array Synthesis: A Complex Lagrange Multipliers Approach  
*J.J. Moncada, Northrop Grumman Corporation*
- 4:20 Center-fed Grid Array Antennas  
*H. Nakano, L. Oshima, H. Mimaki, Hosei University, K. Hirose, Shonan Institute of Technology, J. Yamauchi, Hosei University*
- 4:40 A New Technique of Analysis of Unequally Spaced Linear Arrays  
*B. Preetham Kumar\*, G. R. Branner, University of California, Davis*

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**Thursday PM      AP      Session 56      Salon 5**

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**Scattering IV**

*D. P. Nyquist and R. C. Hall*



- 1:20 Scattering From a Spherical-Circular Microstrip Antenna  
*Hong-Twu Chen\*, Tsurng-Jeng Chang, Yuan-Tung Cheng, Chinese Military Academy*
- 1:40 Radar Cross Section of Multilayer Patch and Aperture Coupled Patch Antennas  
*R.C. Hall\*, D.I. Wu, Boulder Microwave Technologies*
- 2:00 The Use of Huygens' Equivalence Principle for Solving 3D Volume Integral Equation of Scattering  
*Cai-Cheng Lu\*, Weng Cho Chew, University of Illinois*
- 2:20 Efficient Representation of Induced Currents on Large Scatterers Using Complex Exponential Functions  
*Zwi Altman\*, Osamu Hashimoto, Eric Michielssen, Raj Mittra, University of Illinois*
- 2:40 Transient Scattering of a Beam from a Periodic Surface  
*A. Norman, D.P. Nyquist, Michigan State University, East Lansing*
- 3:00 BREAK
- 3:20 Scattering Analysis of Multi-Layered Dielectric Bodies of Revolution - Iterative Method  
*Hyung-Gi Na\*, Hyo-Tae Kim, Pohang University of Science and Technology*
- 3:40 An Improvement on Wave-Function Expansion Analysis for EM Scattering from a Conducting Body  
*C.H. Cheng\*, Zhejiang University, W.X.Zhang, Southeast University*
- 4:00 The Fast Algorithm of Method of Lines in Analyzing the FSS with Oblique Incidence  
*Y. Long, H.Q. Zhu, D.G. Fang\*, Nanjing University of Science and Technology*





- 4:20 Investigation of EM Scattering by Obstacles on Substrate Surface Using Discrete Sources Method  
*Yu. A. Eremin, N. V. Orlov, Moscow State University*
- 4:40 Singular Integral Equations and Three-Dimensional Problems of Electromagnetic Scattering  
*A. Samokhin\*, Moscow Institute Radiotechnics*
- 5:00 Simple Iteration Method for Solving the Problems of LF Electromagnetic Scattering  
*A. Samokhin\*, Moscow Institute Radiotechnics*

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**Thursday PM**

**AP**

**Session 57**

**Salon C**

**Coupling to Microstrip Patch Antennas**

*W. Wiesbeck and J. R. Mosig*



- 1:20 Radiation by Aperture Antennas of Arbitrary Shape Fed by a Covered Microstrip Line  
*Chinglung Chen\*, Nicolaos G. Alexopoulos, University of California, Los Angeles*
- 1:40 Triplate-Fed Arbitrarily-Shaped Annular Ring Slot Antennas  
*Chinglung Chen\*, Nicolaos G. Alexopoulos, University of California, Los Angeles*
- 2:00 Radiation Properties of Ring Microstrip Antenna Fed by Symmetrical Cross Slot  
*M. Sawamura\*, M. Tabata, M. Haneishi, Saitama University*
- 2:20 Analysis of a Cavity-Backed Coaxial Array of Ring-Slot Antennas  
*N. Nikolic\*, J.S. Kot, CSIRO*
- 2:40 Hole-Coupled Patch Antennas  
*G. Di Massa\*, E. Bencivenni, G. Campaniello, Univ. della Calabria, G. Mazzarella, Univ. di Cagliari*
- 3:00 BREAK
- 3:20 Design Considerations for Dual Polarized Aperture-Coupled Microstrip Patch Antennas  
*F. Rostan\*, W. Wiesbeck, University of Karlsruhe*
- 3:40 Analysis of Two Aperture Coupled Antennas with Thick Ground Planes  
*Pamela R. Haddad\*, David M. Pozar, University of Massachusetts, Amherst*
- 4:00 Modeling of Multilayered Aperture-Coupled Planar Antennas  
*Y. Brand, J. R. Mosig\*, Swiss Federal Institute of Technology*
- 4:20 Simplified Analysis of Aperture Coupled Microstrip Antenna Fed by Dielectric Image Line  
*Sridhar Kanamaluru, Ming-yi Li, Kai Chang\*, Texas A&M University*





- 4:40 Simple Method for Analyzing Slot Antennas on Thick Dielectric Substrate  
*Aleksandar Nesic\*, Srdan Suvakov, Miodrag Mikavica, Institute of Microwave Techniques and Electronics*

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**Thursday PM**

**AP**

**Session 58**

**Salon D**

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**Multiple Frequency and Wide Band Microstrip Patch Antennas**

*R. Mittra and D. I. Wu*

- 1:20 Characteristics of a Stacked Microstrip Antenna With an Embedded Parasitic Element  
*Richard Q. Lee\*, NASA Lewis Research Center, Kai-Fong Lee, The University of Toledo*
- 1:40 Wideband Two-Layer Five-Patch Microstrip Antennas  
*K. F. Tong\*, T. M. Au, K. M. Luk, K. F. Lee, City University of Hong Kong*
- 2:00 Double C-Patch Antennas Having Different Aperture Shapes  
*Mohamed Sanad, Nokia Mobile Phones*
- 2:20 Characteristics of Tri-plate Flat Antenna  
*K. Tsukamoto\*, Matsushita Electric Works Ltd., H. Arai, Yokohama National University*
- 2:40 Dual Band Cavity-Backed Quarter-Wave Patch Antenna  
*Amir Boag, Yuval Shimony\*, Alona Boag, Raj Mittra, University of Illinois*
- 3:00 BREAK
- 3:20 Dual-Frequency Microstrip Reflectarray  
*Doris I. Wu\*, Richard C. Hall, Boulder Microwave Technologies, John Huang, JPL*
- 3:40 A Dual-Band Microstrip Array Antenna  
*Tungshing Chan\*, Yeongming Hwang, The Chinese University of Hong Kong*
- 4:00 Rectangular Micro Strip Antennas with Stub Along the Non-Radiating Edge for Dual Band Operation  
*Asha E. Daniel, Girish Kumar, I. I. T., Bombay*
- 4:20 Tunable Dual and Triple Frequency Stub Loaded Rectangular Microstrip Antennas  
*A. E. Daniel, G. Kumar\*, IIT*
- 4:40 Patterns of Stacked Microstrip Patches Antenna  
*J. Xu, Beijing Astronomical Observatory*





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**Thursday PM Joint/URSI-G Session 11 Salon E**

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**Special Session****Transionospheric Propagation***L. M. Duncan and J. Goodman*

- 1:20 A Non-deterministic Transionospheric Transfer Function for a Realistic Three-Dimensional Ionosphere  
*Marisa McCoy\*, John P. Basart, Iowa State University*

- 1:40 Effects of Ionospheric Scintillation on Differential Demodulation of GPS Data  
*Roger A. Dana, Mission Research Corporation*

- 2:00 Mid-Latitude Angle of Arrival Data for Resolved Ionospheric Modes  
*W. M. Sherrill, Q. R. Black\*, B. Brown, Southwest Research Institute*

- 2:20 Synthetic Array Antenna and its Application to the Multipath Propagation Environment  
*A. H. Abu Bakar, MARA Institute of Technology*

- 2:40 The Scintillation Index in an Inhomogeneous (on Average) Ionosphere with Random Large-Scale Irregularities  
*A. V. Kulizhsky, M. V. Tinin, Irkutsk State University*



- 3:00 BREAK

- 3:20 Theoretical Modeling of the Chirp-Sonde Operation when Diagnosing the HF Radio Channel  
*N. V. Ilyin, V. V. Khakhinov\*, V. I. Kurkin, V. E. Nosov, S. N. Ponomarchuk, Institute of Solar-Terrestrial Physics*

- 3:40 The Harnessing of Complicated Signals for Measurements of the Signal Distortions in the Ionospheric Channel  
*A. V. Medvedev, K. G. Ratovsky\*, Institute of Solar-Terrestrial Physics*

- 4:00 Applied Program Packages for Prediction and Current Diagnostics of the HF Radio Channel  
*V. I. Kurkin, V. E. Nosov, S. N. Ponomarchuk\*, S. V. Pushkarev, Institute of Solar-Terrestrial Physics*

- 4:20 Model-Emperical Study of the HF Propagation During Magnetospheric Substorm  
*D. V. Blagoveshchensky\*, State Academy of Aerospace Instrumentation, T. D. Borisova, Arctic and Antarctic Scientific Research Inst.*





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**Thursday PM Joint/URSI-B Session 12 Trimaran/Brigantine**

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**Rough Surfaces**

*G. S. Brown and Y. Kuga*

- 1:20 Analytical and Experimental Studies of Backscattering of Electromagnetic Waves From High-Slope Rough Surfaces  
*Lynn Ailes-Sengers\*, Akira Ishimaru, Yasuo Kuga, University of Washington*
- 1:40 An Improved Kirchhoff Approximation for the Simulation of Electromagnetic Scattering from Rough Surfaces  
*Carlos Torres-Verdin\*, Tarek M. Habashy, Schlumberger-Doll Research*
- 2:00 Scattering of a Gaussian Beam by Roughened Sinusoidal Surfaces  
*David A. Kapp\*, Gary S. Brown, Virginia Polytechnic Institute & State University*
- 2:20 Application of FDTD to Periodic Surface Scattering Problems  
*B. Houshmand, Jet Propulsion Laboratory*
- 2:40 Transient Scattering from a Periodic Sea Surface  
*A. Norman\*, D. P. Nyquist, E. J. Rothwell, K. M. Chen, Michigan State University*



3:00 BREAK



- 3:20 Bistatic Scattering Characteristics of Surface Waves on Dielectric Rough Surfaces  
*Hui Zhao, Yasuo Kuga\*, Akira Ishimaru, University of Washington*
- 3:40 Monte Carlo Simulation of Electromagnetic Scattering From Two-Dimensional Random Rough Surfaces  
*Robert L. Wagner\*, Jiming Song, Weng Cho Chew, University of Illinois*
- 4:00 Electromagnetic Scattering From Slightly Rough Surfaces With Inhomogeneous Dielectric Profile  
*Kamal Sarabandi, The University of Michigan*
- 4:20 Non-Coherent Scattering From a Plasma Slab with a Rough Boundary  
*S. Shulga\*, O. Bagatskaya, N. Zhuck, Kharkov State University*
- 4:40 Infrared Extinction of the Powder of Brass 70Cu/30An Modeled through Random Process  
*Hsing-Yi Chen\*, I-Young Tarn, Yeou-Jou Hwang, Yuan-Ze Institute of Technology*



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**Thursday PM    URSI-D    Session 29    Salon 1/2**

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**Microwaves - Photonics - Electronics**

*L. P. B. Katehi and M. Shur*

- 1:20 Optical Beam Forming and Steering for Phased-Array Antenna  
*Dilip K. Paul\*, Brian J. Markey, Rajender Razdan, COMSAT Laboratories*
- 1:40 Time-Domain Numerical Analysis of Passive and Active Optical Microstructures  
*Rose M. Joseph\*, Susan C. Hagness, Allen Taflove, Northwestern University*
- 2:00 Photonic Bandgap Materials: New FDTD Analysis and Antenna Applications  
*James G. Maloney, Morris P. Kesler\*, Brian L. Shirley, Denver J. York, Georgia Tech Research Institute, Glenn S. Smith, Georgia Institute of Technology*
- 2:20 Macromodeling of Circuit Components for High Frequency Applications  
*Kavita Goverdhanam\*, Emmanouil Tentzeris, Linda P. B. Katehi, The University of Michigan*
- 2:40 An All Optical Millimeter-Microwave Generator  
*K. Daneshvar\*, University of North Carolina, L. Hales, Redstone Arsenal*

3:00 BREAK

- 3:20 Band-Pass Filters Mounted with Cube Dielectric Resonators in Cut-Off Waveguide  
*Sachihiro Toyoda, Takashi Murakami, Osaka Institute of Technology*
- 3:40 A Novel Method for Suppressing Spurious Resonance Responses of the Coaxial-Resonator Bandpass Filters  
*Kouji Wada, Yasumasa Noguchi, Hideaki Fujimoto, Junya Ishii, Kinki University*
- 4:00 A Power Amplifier Based on an Extended Resonance Technique  
*Adam Martin\*, Amir Mortazawi, Bernard C. De Loach, Jr., University of Central Florida*
- 4:20 An Active Ka-Band Antenna Element Amenable to Device Integration  
*D. J. Roscoe\*, Communications Research Centre, L. Shafai, University of Manitoba, M. Cuhaci, A. Ittipiboon, Communications Research Centre*
- 4:40 A Dynamical Analysis of the CMOS Circuit  
*Jilin Tan\*, Guangwen Pan, University of Wisconsin, Milwaukee*
- 5:00 Optical Temperature Sensor Using Surface Plasmon Resonance Technique  
*Sahin Kaya Ozdemir\*, Gonul Turhan-Sayan, Middle East Technical University*

**Numerical Methods**

*K. K. Mei and V. Jamnejad*

- 1:20 A 3D High-Order Unstructured Finite-Volume Algorithm for Solving Maxwell's Equations  
*Yen Liu, NASA Ames Research Center*

- 1:40 Three-Dimensional Calculations Using Impedance Matrix Localization  
*Francis X. Canning\*, Rockwell Science Center, Erik Rosen, SFA, Inc., Luise Schuetz Couchman, Naval Research Laboratory*

- 2:00 Confirming the Invariance of the Measured Equation of Invariance  
*Kenneth K. Mei\*, Yaowu Liu, City University of Hong Kong*

- 2:20 Finite-Difference Analysis of Circular Dielectric-Loaded Waveguides  
*Jenn-Ming Guan\*, Private China Junior College of Technology, Da-Chiang Chang, National Tsinghua University*

- 2:40 Implementation of an Infinite Ground Plane in a 2-D TLM Network  
*John B. Erwin, Stuart M. Wentworth\*, Auburn University*

3:00 BREAK

- 3:20 High-Frequency Asymptotic Reduction of the Fast Multipole Method  
*Robert J. Burkholder\*, Do-Hoon Kwon, Ohio State University*

- 3:40 Resource Management in Time-Domain Maxwell Solvers  
*A. H. Mohammadian\*, W. F. Hall, V. Shankar, Rockwell International Science Center*

- 4:00 Et-Ht FEM Modal Analysis of Transversely Periodic Waveguides  
*Eric W. Lucas\*, Thomas P. Fontana, Westinghouse Electric Corporation*

- 4:20 Degeneration of Rectangular and Triangular Rooftop Functions in the Discretisation of Planar Structures  
*Jeannick Sercu, University of Ghent, Niels Fache, HP-Belgium, Paul Lagasse, University of Ghent*

- 4:40 An Unstaggered, Colocated Scheme for Solving Maxwell's Equations in Curvilinear Coordinates  
*Ramakrishna Janaswamy\*, Naval Postgraduate School, Yen Liu, NASA Ames Research Center*

- 5:00 Fast-Multipole-Method Solution of Two-Dimensional Conductor Geometries  
*Levent Gurel, Bilkent University*



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**Thursday PM    URSI-B    Session 31    Salon B**

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**Boundary Conditions**

*F. X. Canning and W. A. Davis*

- 1:20 Numerical Absorbing Boundary Conditions for the Scalar and Vector Wave Equations

*Bruno Stupfel, Commissariat a l'Engergie Atomique, Raj Mittra, University of Illinois*

- 1:40 Relationship Between Generalized Impedance Boundary Conditions and Absorbing Boundary Conditions

*J. L. Volakis\*, T. B. A. Senior, S. Legault, University of Michigan*

- 2:00 Comparison of Some Absorbing Boundary Conditions for the FDTD-Method

*J. De Moerloose\*, M. A. Stuchly, University of Victoria*

- 2:20 A Numerical Absorbing Boundary Condition for 3D Edge-Based Finite Element Analysis of Very Low Frequency EM Fields

*Amir Boag\*, Israel Aircraft Industries, Raj Mittra, University of Illinois*

- 2:40 Complementary Operators: A Method to Annihilate Artificial Reflections Arising from the Truncation of the Computational Domain in the Solution of Partial Differential Equations

*Omar M. Ramahi, Digital Equipment Corporation*



- 3:00 BREAK

- 3:20 Solution Accuracy Limitations Due to Mesh Features and Boundary Conditions using Edge-based Finite Elements

*Jay W. Parker\*, Cinzia Zuffada, Jet Propulsion Laboratory*

- 3:40 Functional Boundary Conditions for Variational Principles in Electrostatics

*W. A. Davis, Virginia Polytechnic Institute and State University*

- 4:00 Optimization of the Berenger PML for FD-TD Simulations

*Christopher E. Reuter\*, Rome Laboratory/ERST, Rose M. Joseph, Northwestern University, Daniel S. Katz, Cray Research, Inc. Eric T. Thiele, University of Colorado, Allen Tafove, Northwestern University*

- 4:20 Wideband Absorbing Boundary Condition for FD-TD Simulations of Waveguiding Structures in 3-D

*Christopher E. Reuter\*, Rome Laboratory/ERST, Rose M. Joseph, Northwestern University, Daniel S. Katz, Cray Research, Inc., Eric T. Thiele, University of Colorado, Allen Tafove, Northwestern University*






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**Thursday PM    URSI-B    Session 32    Salon F**

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**Special Session**

**Transient Electromagnetic Wave Propagation in Dispersive Media**

*S. L. Dvorak*

- 1:20 FDTD with Linear Dispersion: Simulations of the Interaction of Optical Pulses with Realistic Metallic Gratings  
*Justin B. Judkins, Richard W. Ziolkowski\*, The University of Arizona*

- 1:40 Dispersive Media in FDTD Calculations  
*Raymond Luebbers\*, David Kelley, The Pennsylvania State University*

- 2:00 Radar-Type Transient EM Signals Scattered by Spherical Anomalies in Dispersive Media and Performance Tests for the Extended Born Approximation  
*Evert C. Slob\*, Delft University of Technology, Tarek M. Habashy, Carlos Torres-Verdin, Schlumberger-Doll Research*



- 2:20 Exact, Closed-Form Field Expressions for Transient Plane Waves Incident of Conductive Media (TM CASE)  
*Hsueh-yuan Pao, Hughes Missile Systems Company, Steven L. Dvorak, Donald G. Dudley, University of Arizona*



- 2:40 Asymptotic Description of Transient Electromagnetic Wave Propagation in Lossy Dispersive Media  
*Kurt. E. Oughstun, University of Vermont*

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**Thursday PM    URSI-B    Session 33    Schooner/Sloop**

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**Theoretical Electromagnetics II**

*O. B. Kesler and E. V. Jull*

- 1:20 Slot Antenna on Perfectly Conducting Spheroid Coated with Homogeneous Materials  
*A. A. Sebak\*, M. Zhang, University of Manitoba*

- 1:40 Simple Scattering Analysis of Finite Periodic Structure Boundaries  
*Jacob J. Kim, Oren B. Kesler\*, Texas Instruments*

- 2:00 Off-Bragg Blazing with Rectangular Gratings: New Results  
*Wei Chen, D. G. Michelson, E. V. Jull\*, University of British Columbia*





- 2:20 Quasi-addition Expression for Thin Spheroids  
*T. Do-Nhat\*, R. H. MacPhie, University of Waterloo*
- 2:40 Deflection Angle of a Light Ray Due to the Effects of Both Gravitational and Electrostatic Fields of a Charged Body  
*T. Do-Nhat\*, University of Waterloo*
- 3:00 BREAK
- 3:20 The Scattering of Waves by a Spheroidal Cavity-Backed Aperture  
*Elena D. Vinogradova, Institute of Radiophysics & Electronics of the National Academy of Sciences of the Ukraine*
- 3:40 Electromagnetic Wave Scattering by Wire Antennas with a Local Nonlinear Load at the Presence of Two Media  
*A. A. Gorbachev, T. M. Zaboronkova, S. P. Tarakankov, Radiophysical Research Institute*
- 4:00 Bistable Regime of Surface Magnetoplasmon-Polariton Modes Excitation in Kretschmann Configuration  
*K. N. Ostrikov\*, N. A. Azarenkov, O. A. Osmayev, Kharkov State University & Scientific Centre for Physical Technologies*
- 4:20 Capabilities to Control Spurious Radiation of Antennas with Nonlinear Elements  
*Y. S. Shifrin\*, A. I. Luchaninov, V. M. Shokalo, Kharkov State Technical University of Radio Electronics*
- 4:40 Analysis of Circular Dielectric Waveguide with Periodically Varying Cross-section by Effective Cross-section Approach  
*Protag Pramanick\*, Abbas Mohannadi, The University of Saskatchewan*

